TRAINING PROGRAM OF INSTRUCTION (TPI)

FOR

AFIS-BTVEM

BASIC TELEVISION EQUIPMENT MAINTENANCE COURSE

Approved by:

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Eugene Harper, Jr.
Director of Training
American Forces Information Service

Approval Date:

Supercedes TPI dated: June 1999

BASIC TELEVISION EQUIPMENT MAINTENANCE COURSE

TRAINING PROGRAM OF INSTRUCTION

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TRAINING PROGRAM OF INSTRUCTION

Preface

TRAINING PROGRAM OF INSTRUCTION FILE NUMBER (TPFN): AFIS-BTVEM

TITLE: Basic Television Equipment Maintenance Course

TRAINING LOCATION: Defense Information School, Fort George G. Meade, Maryland

SPECIALTY AWARDED: USA MOS 25R10
USAF AFSC 2E1X4

PURPOSE: To identify the training requirements for award of the aforementioned occupational specialties. This document provides a summary of the training objectives and activities used to fulfill the Service's mandated knowledge and performance skill competencies to be experienced and achieved by each student in order to successfully complete this course.

COURSE DESCRIPTION: This course provides instruction on the basic concepts of operation, fundamental maintenance, and repair skills for all aspects of television systems. This includes practical hands-on training in the use of test equipment, troubleshooting and repair of monitors, receivers, television cameras, videotape recorders, audio systems, broadcast studio and transmission systems.

PREREQUISITES: US Army: minimum EL score of 110 on the ASVAB; be a graduate of Electronic Fundamentals Course (DINFOS); have normal color vision; profile series: PUHLES 212221; cannot experience acrophobia, claustrophobia, or vertigo; and be able to lift 75 lbs.

US Air Force: AQE 80 percentile; to have completed Electronic Principles Training (Keesler); be able to lift 50 lbs.; and have normal color vision.

SECURITY CLEARANCE: None

CLASS SIZE:

MAXIMUM: 8

MINIMUM: 4

ANNUAL COURSE CAPACITY: 112

COURSE LENGTH: 87 training days.

ACADEMIC HOURS: 682

ADMINISTRATIVE HOURS: 14

TOTAL COURSE HOURS: 696

INSTRUCTOR CONTACT HOURS: 1051.5

TYPE/METHOD OF INSTRUCTION:	**HOURS:**
ADMINISTRATIVE (AD):	14 Hrs
CONFERENCE/LECTURE (CL):	256.25 Hrs
DEMONSTRATION (D)	57.25 Hrs
PERFORMANCE EXERCISE (PE):	221 Hrs
PERFORMANCE EXAMINATION (EP):	91.25 Hrs
WRITTEN EXAMINATION (EW):	56.25 Hrs
COMPUTER ASSISTED INSTRUCTION (CAI)	reinforcing instructional use

TRAINING START DATE: 1 October 2001.

ENVIRONMENTAL IMPACT: None. DoD policy was followed to assess the environmental impact.

MANPOWER: The Interservice Training Review Organization (ITRO) formula was used to determine the number of instructors required.

EQUIPMENT AND FACILITIES: The Course Design Resource Estimate (CDRE) contains this information.

TRAINING DEVELOPMENT PROPONENT: Defense Information School, Course and Faculty Development, (301) 677-3272; DSN 622-3273

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-001-

TITLE: Principles of Safety (OSHA standards)

TPFN TYPE AND HOURS: 1.5 L; 1.5 EW

TPFN TOTAL HOURS: 3

PREREQUISITE TPFN: None

TASK(S): Identify

001 Personal risks to include radiation hazard standard.
002 Environmental and HAZMAT considerations.
003 Electrical and equipment safety.

SUMMARY OF INSTRUCTION: Given extracts from the Occupational Safety and Health Administration's (OSHA) regulations/guidelines and the DoD radiation hazard standard (included in student handout), the student identifies the dangers associated with radiation and electrical current to personal and equipment safety, the dangers of hazardous materials (HAZMAT) to personnel and the environment, and the OSHA and DoD standards of safety in the workplace. Comprehension is measured with written evaluations. The student must correctly answer at least 70 percent of the questions for each objective. The student will also demonstrate the ability to apply these safety principles throughout the entire BTVEM Course during all daily classroom activities, including practice performances, performance evaluations, and examinations.

REFERENCES: Student study guide

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-002-

TITLE: General Repair Considerations

TPFN TYPE AND HOURS: 1.5 L; 1 EW

TPFN TOTAL HOURS: 2.5

PREREQUISITE TPFN: None

TASK(S): Identify

001 Corrosion control fundamentals.
002 Grounding (AC and signal).

SUMMARY OF INSTRUCTION: Given a list of terms and partial definitions, the student identifies various types of corrosion and their causes; selects control methods used to prevent and treat corrosion; identifies proper electronic equipment grounding techniques, how to detect grounding problems, and the consequences that arise from improper grounding. Comprehension is measured using written evaluations. To complete each objective, the student must answer 70 percent of all questions correctly. The student will also demonstrate the use of proper grounding techniques throughout the entire BTVEM course during all classroom activities, including practice performances, performance exercises, and examinations.

REFERENCES: Student study guide and student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-003-

TITLE: Basic Principles of Television/Radio

TPFN TYPE AND HOURS: 34.5 L, 2.5 EW

TPFN TOTAL HOURS: 37

PREREQUISITE TPFN: None

TASK(S): Identify

001 Analog video signal.
002 Digital video signal.
003 Audio signal (analog/digital).

SUMMARY OF INSTRUCTION: Given information about, or a sample of, video and/or audio signals, the student describes the basic concepts of composite video; the theories and identifiable characteristics of deflection and scanning, analog video, colorimetry, digital video, and analog/digital audio in accordance with National Television Systems Committee (NTSC) standards; digital signal processing, including the differences and similarities of component and composite digital video signals. Emphasis is placed on analog video, as the student must achieve a firm comprehension of those essential concepts and characteristics. This information is necessary to assure student success, as it is referenced extensively with later instruction in monitor, receiver, and television camera functional areas. During the analog video objective, quizzes are given frequently to determine if the student is progressing. The quiz grades do not satisfy the written examination requirements. Student competency is measured using written evaluations. To complete each objective, the student must answer 70 percent of all questions correctly. The student also applies this knowledge throughout the entire BTVEM Course during all classroom activities, including practice performances, performance exercises, and examinations.

REFERENCES: Student study guide and handouts (Basic Television and Video Systems)

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-004-

TITLE: Basic Principles of Transmission

TPFN TYPE AND HOURS: 3.5 L, .5 EW

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: None

TASK(S): 001 Identify RF transmission theory (AM/FM/TV).

SUMMARY OF INSTRUCTION: Given a list of terms and definitions, the student identifies frequency allocations in the radio frequency (RF) spectrum, and technical components and characteristics of transmitting AM/FM/TV signals. Each student must achieve a firm comprehension of the TV transmission theory prior to entering the monitor functional area. The student participates in a guided discussion on the different types and characteristics of antenna systems. The student is also introduced to different types of data transmission and reception, and the fundamentals of a studio transmitter link. Comprehension of subject material is measured using written examinations. The student must correctly answer at least 70 percent of the questions for each objective. The student also applies this knowledge to demonstrate performance competencies throughout the monitor, studio, and transmission functional areas of the BTVEM Course.

REFERENCES: Student study guide and handouts.

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-005-

TITLE: Introduction to Troubleshooting

TPFN TYPE AND HOURS: 1.5 L; 1 D; 1 PE; .5 EW; 2 EP

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of troubleshooting.
002 Use block diagrams.
003 Use component diagrams.
004 Use schematics.
005 Use logic diagram flow charts.

SUMMARY OF INSTRUCTION: Given block diagrams, component diagrams, schematics, and logic diagram flow charts, the student identifies troubleshooting steps, signal and component locations, and board functions of a sample piece of broadcast equipment. Comprehension of subject material is measured with performance/written examinations. To satisfactorily pass each objective, students must correctly answer at least 70 percent of the questions and problems. The student also applies this knowledge to demonstrate performance competencies throughout the rest of the BTVEM Course.

REFERENCES: Student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-006-

TITLE: Test Equipment for Video Measurements

TPFN TYPE AND HOURS: 3 D; 11.5 PE; 4.5 EP

TPFN TOTAL HOURS: 19

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Use

001 Waveform monitor.
002 Vectorscope.
003 Oscilloscope.
004 Video test signal generator.
005 Digital multimeter.
006 Analog multimeter.
007 Frequency counter.

SUMMARY OF INSTRUCTION: Given each piece of test equipment listed above, a sample piece of broadcast equipment, a signal generator, and manufacturers' manuals, the student measures the composite video signals, basic electronic signals, and electronic component values. Student competency is measured using performance evaluations. Each student must demonstrate proficiency by successfully completing individual performance evaluations in accordance with criteria developed from the manufacturer's manual for the purpose and use of each diagnostic tool. The student also applies this knowledge to demonstrate performance competencies throughout the rest of the BTVEM Course.

REFERENCES: Student handouts, student study guide, and manufacturers' manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-007-

TITLE: Future of Broadcast Television

TPFN TYPE AND HOURS: .25 L; .25 EW

TPFN TOTAL HOURS: .5

PREREQUISITE TPFN: None

TASK(S): 001 Assess new technology initiatives.

SUMMARY OF INSTRUCTION: Given a Tektronix VM-700A Video Measurement Set and the manufacturer's user manual, the student identifies the basic functions and capabilities of the VM-700A. Comprehension of subject material is measured using a written evaluation. To satisfactorily pass this objective, each student must correctly answer at least 70 percent of questions on the written examination.

REFERENCES: Tektronix VM-700A User's Manual

INSTRUCTOR/STUDENT RATIO: 1:8 (D, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 1
Fundamentals of Television

TPFN: AFIS-BTVEM-001-008-

TITLE: Student Progress Measurement

TPFN TYPE AND HOURS: 4 EP

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Functional area performance exam / critique.

SUMMARY OF INSTRUCTION: The student measures or analyzes a composite video signal. Each student must determine the correct frequency, time, width, and amplitude (peak to peak and IRE) measurement for selected signals. Also, the student is required to measure the correct vector plot of selected colors in reference to the color burst signal. The student must complete published performance criteria for each objective and achieve the programmed results within 1.5 hours.

REFERENCES: Manufacturers' manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-001-

TITLE: Monitor Operations

TPFN TYPE AND HOURS: 31 L; 3 EW

TPFN TOTAL HOURS: 34

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify principles using

001 Block diagrams.
002 Circuit diagrams.
003 Component diagrams.

SUMMARY OF INSTRUCTION: Given a television monitor and appropriate diagrams, as listed above, the student identifies the signal path through the monitor's cathode ray tube (CRT). The student also analyzes monitor operations to identify the signal types and levels present at various points in the monitor. The student must correctly answer at least 70 percent of the questions on the written examination of each objective.

REFERENCES: Student study guide, handouts of monitor schematics, and component diagrams.

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-002-

TITLE: Testing Monitor Operation

TPFN TYPE AND HOURS: .5 D; 1.5 PE; 1 EP

TPFN TOTAL HOURS: 3

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Use radio frequency signal generator.
002 Perform operational check.

SUMMARY OF INSTRUCTION: Given a TV monitor, a test signal generator and other appropriate test equipment, and manufacturers' technical manuals, the student injects test signals into various circuits of the monitor to perform an operational check of the monitor in accordance with the procedures and signal parameters as stated in the manufacturers' manuals. The student is required to demonstrate proficiency by properly using the signal generator. The student practices and demonstrates all of the steps necessary to produce a proper picture on the monitor and confirmation of correct operation. The criteria for the performance evaluation and the critique of the student's proficiency for proper operation are established in accordance with (IAW) the manufacturer's technical manuals.

REFERENCES: Student handout and student study guide

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-003-

TITLE: Monitor Circuit Checks

TPFN TYPE AND HOURS: 1 D; 1 PE; 1.5 EP

TPFN TOTAL HOURS: 3.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Align

001 Power supply circuits (enabling).
002 Deflection circuits.
003 High-voltage circuits.

SUMMARY OF INSTRUCTION: Given a TV monitor, alignment tools, appropriate test and measurement equipment, and manufacturers' technical manuals, the student aligns each of the circuits listed above in accordance with the manufacturer's guidelines as listed in the technical manuals. The student is required to demonstrate proficiency by satisfactorily completing the alignments to industry standards as extracted from manufacturer's technical manuals.

REFERENCES: Student handout and student study guide

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-004-

TITLE: Receiver Operation

TPFN TYPE AND HOURS: 14.5 L; 1.5 EW

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify principles using

001 Block diagrams.
002 Circuit diagrams.
003 Circuit components.

SUMMARY OF INSTRUCTION: Given a TV receiver and its technical manual, block diagrams, circuit diagrams, and circuit component diagrams and listings, the student identifies operational defects of a TV receiver by tracing signals through the various circuits. Primary emphasis is placed on identification of a defective circuit component. Comprehension of subject material is measured using written evaluations. The student must correctly answer at least 70 percent of the questions for each objective.

REFERENCES: Student study guide; monitor and receiver schematics, flow charts, component diagrams, and logic diagram handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-005-

TITLE: Audio-Visual Measurement and Cathode Ray Tube Analysis

TPFN TYPE AND HOURS: 1.5 L; .5 D; 1.5 PE; 1 EW

TPFN TOTAL HOURS: 4.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Degauss CRT (instructor demonstrated).
002 Identify CRT replacement techniques.

SUMMARY OF INSTRUCTION: Given a TV monitor or receiver, appropriate test equipment, and manufacturer's technical manual, the student tests the operational condition of the CRT and identifies the steps involved in replacing the CRT in accordance with manufacturer's technical manual and appropriate safety guidelines. Proficiency is determined by the student's ability to perform a CRT analysis and by a written examination that requires the student to answer at least 70 percent of questions correctly for each objective.

REFERENCES: Student handout, student study guide, and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-006-

TITLE: Receiver Operation and Circuit Checks

TPFN TYPE AND HOURS: 1.5 D; 2 PE; 2.5 EP

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
- 001 Perform operational check on receiver.
- 002 Check power supply circuits (enabling).
- 003 Align deflection circuits.
- 004 Align high-voltage circuits.
- 005 Align convergence circuits (enabling).

SUMMARY OF INSTRUCTION: Given a TV receiver, alignment tools, test equipment, and manufacturer's manual, the student performs an operational check on the receiver, checks the power supply circuits, and aligns the circuits listed above in accordance with the manufacturer's technical manuals and verified by correct operation of the receiver. The student is required to demonstrate proficiency of the circuit checks and alignments without error, in accordance with criteria extracted from the manufacturer's technical manuals, but may receive two instructor assists (a student's question or uncertainty of how to proceed is answered by the instructor). An observation of a safety violation results in a student being required to retest.

REFERENCES: Student handouts; student study guide; and manufacturer's manual

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-007-

TITLE: Analyze Circuits to the Component Level

TPFN TYPE AND HOURS: 3.25 D; 23.25 PE; 6.5 EP

TPFN TOTAL HOURS: 33

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Troubleshoot

001 Video.
002 Audio.
003 Chroma.
004 Deflection.
005 Low voltage.
006 High voltage.
007 Radio frequency / intermediate frequency (tuner).

SUMMARY OF INSTRUCTION: Given a malfunctioning TV monitor or receiver, appropriate test equipment, and manufacturer's technical manual that includes schematics, the student troubleshoots, down to the component level, various circuits as listed above. One instructor assist is permitted per task, and a safety violation at any point results in termination of the evaluation, and the student must retest. The student's comprehension of tuner frequency troubleshooting is measured with a written evaluation. The student must correctly answer at least 70 percent of the questions for each objective.

REFERENCES: Student handout; student study guide; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 2
Monitors and Receivers

TPFN: AFIS-BTVEM-002-008-

TITLE: Student Progress Measurement

TPFN TYPE AND HOURS: 4 EP

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Functional area performance exam / critique.

SUMMARY OF INSTRUCTION: The student is required to successfully troubleshoot the monitor/receiver to component level. The student may receive one instructor assist and is not allowed one safety violation. The student must also complete this performance evaluation within the specified time limit.

REFERENCES: Student handout; student study guide; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 3
Television Camera

TPFN: AFIS-BTVEM-003-001-

TITLE: Television Camera Basics

TPFN TYPE AND HOURS: 5 L; 1 EW

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify principles of

001 Optical systems (enabling).
002 Charge coupled device. (CCD).

SUMMARY OF INSTRUCTION: Students describe theory, structure, and operations of various CCDs. Given a broadcast quality video camera and manufacturer's manual, the student describes the fundamental concepts and components of camera optical systems and the basic principles and characteristics of images. Comprehension is measured with a written evaluation. The student must correctly answer at least 70 percent of the questions for each objective.

REFERENCES: Student study guide

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 3
Television Camera

TPFN: AFIS-BTVEM-003-002-

TITLE: Television Camera Concepts and Alignments.

TPFN TYPE AND HOURS: 15.5 L; 2.5 EW; 4.16 D; 11.16 PE; 4.68 EP

TPFN TOTAL HOURS: 38

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify power supply board concepts.
002 Perform power supply board alignments.
003 Identify sync generator board concepts.
004 Identify video amplifier board concepts.
005 Perform alignments on video pre-amplifier.
006 Perform alignments on video amplifier board. (enabling)
007 Perform alignments on shading circuits.
008 Identify processor board concepts.
009 Perform alignments on gamma circuits.
010 Identify encoder board concepts.
011 Perform alignments on encoder circuits.

SUMMARY OF INSTRUCTION: Given a camera and manufacturer's technical manual, the student identifies the principles of the television camera systems and the alignments required for proper camera set-up. Comprehension is measured with a written evaluation. The student must correctly answer at least 70 percent of the questions for each knowledge objective. The knowledge-based instruction provides the crucial foundation for subsequent performance units for alignments. The students demonstrate proficiency by aligning the circuits without error. The alignments enhance the knowledge-based instruction for a total understanding of the camera

REFERENCES: Student study guide

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW): 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 3
Television Camera

TPFN: AFIS-BTVEM-003-003-

TITLE: Television Camera Operation.

TPFN TYPE AND HOURS: 1.5 D; 3 PE; 1.5 EP

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Remove and replace lens assembly.
002 Adjust back focus and tracking.
003 Perform an operational check.

SUMMARY OF INSTRUCTION: Given a camera, appropriate test equipment, and the manufacturer's technical manual, the student removes and replaces the lens assembly, adjusts back focus and tracking, and conducts an operational check in accordance with the manufacturer's technical manual. The student demonstrates proficiency by removing and replacing the lens assembly without error, then performs a mechanical back focus adjustment. Students perform an operational check of the camera IAW the manufacturer's technical manual without error or safety violation.

REFERENCES: Manufacturer's technical manual

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 3
Television Camera

TPFN: AFIS-BTVEM-003-004-

TITLE: Television Camera Repair.

TPFN TYPE AND HOURS: 2 D; 13 PE; 1 EP

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Troubleshoot to card level.

SUMMARY OF INSTRUCTION: Given a camera, test equipment, alignment tools, and the manufacturer's technical manual, the student troubleshoots the camera to identify malfunctions to the card level. Performance measurement and evaluation is based on task completion without error, allowing up to one instructor assist, and no safety violations. Students will also use Computer Aided Instruction (CAI) to help identify potential problems with the camera.

REFERENCES: Student handout, and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 3
Television Camera

TPFN: AFIS-BTVEM-003-005-

TITLE: Digital Signal Processing (DSP).

TPFN TYPE AND HOURS: 4.5 L; .5 EW; 1.5 D; 4.5 PE; 3 EP

TPFN TOTAL HOURS: 14

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of DSP television camera system.
002 Align encoder/sync circuits.
003 Align interface circuits. (enabling)
004 Align video amplifier circuits. (enabling)

SUMMARY OF INSTRUCTION: Given a DSP camera and the manufacturer's manual, the student identifies the fundamental concepts and basic principles of the camera using block diagrams and circuit descriptions, and describes digital signal processing in the camera. Instruction, even though specific to the Sony DXC-D30 camera, provides the student a general understanding of DSP camera circuitry. Comprehension is measured with a written examination. Each student is required to correctly answer at least 70 percent of the questions to pass the knowledge based objective and demonstrate proficiency by aligning circuits discussed without error. The alignments apply the knowledge-based instruction for a total understanding of the camera.

REFERENCES: Student handout, and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-001-

TITLE: Introduction to Audio Concepts

TPFN TYPE AND HOURS: 1. 5 L; 5 EW

TPFN TOTAL HOURS: 2

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Understand audio concepts using block diagrams, and circuit/component descriptions.

SUMMARY OF INSTRUCTION: Given an audio studio with various recording, playback, storage, amplification, processing, and monitoring devices, and block diagrams of said devices, the student describes the path of the audio signal through the various devices and identifies the functions of each device. Comprehension of subject material is measured using written examinations in which the student must correctly answer at least 70 percent of the questions.

REFERENCES: Student handouts of block diagrams and schematic symbols.

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-002-

TITLE: Principles of Audio (Analog)

TPFN TYPE AND HOURS: 7 L; 3.5 EW

TPFN TOTAL HOURS: 10.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify

001 Frequency response.
002 Impedance matching.
003 Signal-to-noise ratio.
004 Balanced and unbalanced signals.
005 Pre-emphasis/de-emphasis.
006 Signal grounding.
007 Connector types.
008 Stereo (phasing).
009 Microphones (types and uses).

SUMMARY OF INSTRUCTION: Students must correctly identify the characteristics of analog audio. Given different types of microphones and other selected pieces of audio equipment that have differing input and output specifications, the student defines the terms listed above; chooses the correct type of microphone to use in different environments; and describes the effects of various environmental conditions have on producing or reproducing audio. Comprehension of subject material is measured using written examinations in which the student must correctly answer at least 70 percent of the questions.

REFERENCES: Student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-003-

TITLE: Test and Measurement Equipment

TPFN TYPE AND HOURS: 1 D; 2 PE; 1 EP

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Use oscillators.
002 Use audio generator/analyzer.

SUMMARY OF INSTRUCTION: Given audio signal generator, an audio analyzer, oscillators, and manufacturers' technical manuals, the student connects the pieces of test equipment to each other, produces selected audio signals, analyzes those signals for proper output criteria, and diagnoses faulty equipment based on the signals produced. Comprehension of subject material will be measured using performance evaluations. The student must correctly use a test signal generator, analyze signals on the audio analyzer, and diagnose programmed faulty signals without error or safety violation.

REFERENCES: Manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-004-

TITLE: Principles of Audio II (Digital)

TPFN TYPE AND HOURS: 2.5 L; 1 EW

TPFN TOTAL HOURS: 3.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify

001 Principles of digital audio. (enabling)
002 Characteristics of analog vs. digital (compression techniques)

SUMMARY OF INSTRUCTION: Given a list of terms, the student will correctly identify the characteristics of digital audio. The student will also correctly identify modes of compression used with various types of audio technology. Comprehension is measured with a written examination. The student must correctly answer at least 70 percent of the questions.

REFERENCES: Student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-005-

TITLE: Maintenance of Compact Disc Decks (Digital)

TPFN TYPE AND HOURS: 2 L; .5 EW; .75 D; 1.75 PE; 1 EP

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of operation.
002 Perform operational checks.
003 Perform cleaning and alignment of CD players.

SUMMARY OF INSTRUCTION: Students must correctly identify the principles of compact disk playback. Given the manufacturers technical manual, the student must successfully perform an operational check and clean the CD player. The student must also align the CD player IAW manufacturers guidelines. Comprehension of task 001 is measured by a written examination in which the student must correctly answer at least 70 percent of the questions. Proficiency of task 002 and 003 is measured by a performance examination. The student must perform the task IAW the manufacturer's guidelines, and with no safety violations.

REFERENCES: Student handouts and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-006-

TITLE: Maintenance of Recording Systems

TPFN TYPE AND HOURS: 3 L; 1 D; 3 PE; 2 EP; 1 EW

TPFN TOTAL HOURS: 10

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify magnetic recording principles.
002 Identify analog cassette / DAT / MD principles.
003 Perform analog cassette / DAT / MD operational checks.
004 Demagnetize heads and lubricate tape paths. (enabling)

SUMMARY OF INSTRUCTION: Students must correctly identify the principles of magnetic recording. Students must also be able to identify the principles of analog cassette, digital audiotape and mini disk recording systems. The student must successfully perform an operational check IAW the manufacturers manual. Comprehension is measured using written and performance evaluations. The student must correctly answer at least 75 percent of the questions on the written evaluation. Additionally, the student must perform an operations check, an alignment, and troubleshooting procedures on a distribution amplifier with no errors or safety violations IAW the manufacturer's guidelines.

REFERENCES: Block diagrams; student handouts; manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-007-

TITLE: Maintenance of Audio Recorder Systems (Digicart)

TPFN TYPE AND HOURS: .5 L; .25 D; 1 PE; .75 EP; .5 EW

TPFN TOTAL HOURS: 3

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Identify principles of operation.
002 Perform operational checks.

SUMMARY OF INSTRUCTION: Given a digital audio recording device (Digicart), an incoming signal to record, appropriate test equipment and manufacturers technical manuals, the student identifies the functions of key circuit boards of the recording device and performs an operating check of the device. The student must correctly answer at least 75 percent of the questions on the written evaluation. Additionally, the student must perform an operations check on a audio recorder system with no errors or safety violations IAW the manufacturer's guidelines.

REFERENCES: Block diagrams; student handouts; manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-008-

TITLE: Troubleshooting of Audio Distribution Systems.

TPFN TYPE AND HOURS: 1.5 L; .75 D; 4.25 PE; 1.5 EP; .5 EW

TPFN TOTAL HOURS: 8.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of operation.
002 Perform operational checks.
003 Align audio distribution system.
004 Troubleshoot to board level.

SUMMARY OF INSTRUCTION: Given an audio console, audio equalizers, all appropriate test equipment, and manufacturers' technical manuals; the student identifies the features and operating functions of the audio distribution system. The student then performs an operations check and alignment, and troubleshoots the audio distribution system. Comprehension of task 001 is measured with a written examination. The student must correctly answer at least 70 percent of the questions for this task. Comprehension of tasks 002 – 004 is measured with performance evaluations. The student must perform tasks 002 - 004 in accordance with manufacturers' guidelines and with no safety violations.

REFERENCES: Student handouts; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-009-

TITLE: Troubleshooting of Audio Consoles.

TPFN TYPE AND HOURS: 2.75 L; 2 D; 9 PE; 4 EP; .75 EW

TPFN TOTAL HOURS: 18.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of operation.
002 Identify principles of audio equalization (telephone line interface)
003 Perform operational checks.
004 Align (balance).
005 Troubleshoot to board level.

SUMMARY OF INSTRUCTION: Given an audio console, audio equalizers, all appropriate test equipment, and manufacturers' technical manuals, the student identifies the features and operating functions of the console and the equalizer; performs an operations check and alignment of the console and the equalizer; and troubleshoots the console and equalizer. Comprehension of tasks 001 and 002 is measured with written examinations. The student must correctly answer at least 70 percent of the questions for each task. Comprehension of tasks 003 – 005 is measured with performance evaluations. The student must perform tasks 003 and 004 in accordance with manufacturers' guidelines and with no safety violations. The student must perform task 006 by correctly identifying the problem down to the board level and with no safety violations.

REFERENCES: Student handouts; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 4
Audio

TPFN: AFIS-BTVEM-004-010-

TITLE: Student Progress Measurement.

TPFN TYPE AND HOURS: 1 D; 9 PE; 2 EP

TPFN TOTAL HOURS: 12

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Audio studio troubleshooting. (enabling)
002 Mid-course student critique (KM&RSCH).

SUMMARY OF INSTRUCTION: Given an audio studio, all appropriate test equipment, and manufacturers' technical manuals; the student must identify and correct programmed malfunctions in accordance with manufacturers' guidelines with no errors and with no safety violations. Given a survey from KM&RSCH, the student provides feedback and recommendations regarding the quality of the course of instruction for BTVEM functional areas 1 - 4.

REFERENCES: Block diagrams; student handouts; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP); 1:8 (AD)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 5
Video Tape Recorders (VTR)

TPFN: AFIS-BTVEM-005-001-

TITLE: VTR Operation

TPFN TYPE AND HOURS: 11.5 L/CAI; 1.5 EW

TPFN TOTAL HOURS: 13

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify principles of
001 Analog VTRs.
002 Digital VTRs.

SUMMARY OF INSTRUCTION: Given an analog VTR and a list of features and functions of a digital VTR, appropriate test equipment and monitors, and manufacturer's technical manual, the student identifies video tape tracks; describes VTR modes of operation and limitations; and explains the similarities and differences of analog and digital VTR formats. Comprehension is measured with written examinations. The student must correctly answer at least 70 percent of the questions for each objective.

REFERENCES: Student study guide

INSTRUCTOR/STUDENT RATIO: 1:8(L/CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

****NOTE:** The "Terms & Definitions" portion of the VTR TEI will be made available for reinforcement and remediation during this first learning objective of the block.

FUNCTIONAL AREA 5
Video Tape Recorders (VTR)

TPFN: AFIS-BTVEM-005-002-

TITLE: VTR Maintenance

TPFN TYPE AND HOURS: 2.5 L/CAI; 1 D; 5 PE/CAI; 2 EP; .5 EW

TPFN TOTAL HOURS: 11

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Perform operational check/diagnostic check.
002 Perform routine cleaning and lubrication.
003 Remove and replace Video Head Drum (instructor-demonstrated only).

SUMMARY OF INSTRUCTION: Given a VTR, an input signal, all appropriate test equipment, and manufacturers' technical manuals the student performs operations checks, diagnostic checks, routine cleaning, and lubrication. The student also identifies key terms and circuit boards associated with the above tasks, and further explains the steps involved in removing and replacing the video head drum. Comprehension is measured with performance evaluations of tasks 001 and 002 and with a written examination on task 003. The student must perform the tasks IAW the manufacturer's guidelines and with no safety violations. The student must correctly answer at least 70 percent of the questions on the written exam for objective 003.

REFERENCES: Student handout and manufacturer's technical manual

INSTRUCTOR/STUDENT RATIO: 1:8 (L/CAI, EW); 1:4 (PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

****NOTE:** The VTR CAI program will be incorporated into the lecture portion of this learning objective. It will also be used as reinforcement training during the hands-on practice time of the class, when there are normally one to four students practicing a performance task and the other students are waiting for their turn to practice.

FUNCTIONAL AREA 5
Video Tape Recorders (VTR)

TPFN: AFIS-BTVEM-005-003-

TITLE: VTR concepts and alignments (block diagrams, circuit description, and circuit components)

TPFN TYPE AND HOURS: 26 L; 2.5 D; 15.5 PE; 3 EP; 2 EW

TPFN TOTAL HOURS: 49

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify mechanical concepts.
002 Perform mechanical alignments.
003 Identify servo circuit concepts.
004 Perform servo alignments. (enabling)
005 Identify video/RF circuit concepts.
006 Perform video/RF alignments.
007 Identify audio circuit concepts.
008 Perform audio alignments.

SUMMARY OF INSTRUCTION: Given a VTR, all appropriate test equipment, and manufacturer's technical manuals, the student identifies the signal path through the circuits listed in tasks 001, 003, 005, and 007;and performs the alignments listed in tasks 002, 004, 006, and 008. Comprehension of tasks 001, 003, 005, and 007 is measured with written examinations. The student must score at least a 70 percent on each objective. Proficiency of tasks 002, 004, 006, and 008 is measured with performance evaluations. The student must perform the alignments IAW the manufacturer's guidelines with no safety violations.

REFERENCES: Student study guide and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 5
Video Tape Recorders (VTR)

TPFN: AFIS-BTVEM-005-004-

TITLE: VTR Repair to Board Level.

TPFN TYPE AND HOURS: 2.5 D; 10 PE; 2.5 EP

TPFN TOTAL HOURS: 15

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Troubleshoot

001 Mechanical system.
002 Servo circuits.
003 Video/RF circuits.
004 Audio circuits.
005 System control.

SUMMARY OF INSTRUCTION: Given a VTR, all appropriate test equipment, and manufacturer's technical manual, the student will diagnose faults in the circuits identified above, specifying the faulty circuit card and isolating the probable faulty component(s). Comprehension is measured by performance exercises. The student must perform each troubleshooting exercise without safety violations and with limited instructor assistance.

REFERENCES: Student study guide; manufacturer's technical manual

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 5
Video Tape Recorders (VTR)

TPFN: AFIS-BTVEM-005-005-

TITLE: Student Progress Measurement.

TPFN TYPE AND HOURS: .5 D; 6.5 PE; 1 EP

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Functional area performance exam/critique.

SUMMARY OF INSTRUCTION: Given a VTR, manufacturer's technical manual, and all appropriate test equipment the student troubleshoots the VTR, specifying the faulty circuit board and isolating the probable faulty component(s); and recommends appropriate repair procedures without safety violations, and with no more than two instructor assists. Troubleshooting procedures and recommended repair are done IAW with manufacturer's guidelines.

REFERENCES: Student study guide and manufacturer's technical manual

INSTRUCTOR/STUDENT RATIO: 1:4 (EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-001-

TITLE: Overview of Studio Systems.

TPFN TYPE AND HOURS: 7 L; 1 EW

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Identify principles of studio systems.
002 Recognize trends in new technology.

SUMMARY OF INSTRUCTION: Given a list of various types of TV studios and the essential components within them, the student identifies the differences of those studios; identifies the functions of the essential components within the studios, identifies trends in new digital technology; and compares and contrasts digital and analog systems. Comprehension is measured using written evaluations; the student must correctly answer at least 70 percent of the questions for each objective.

REFERENCES: Student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-002-

TITLE: Studio Generators.

TPFN TYPE AND HOURS: 3 L; 1 D; 1 PE; 2 EP; 1 EW

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Understand principles of sync/test signal generator.
002 Perform operation checks of sync/test signal generator.
003 Understand principles of operation of character generator.
004 Perform operation checks of character generator.

SUMMARY OF INSTRUCTION: Given a sync/test signal generator and a character generator in a TV studio environment, manufacturers' technical manuals, and all appropriate test equipment, the student identifies the functions of each generator, and performs an operations check of each generator. Comprehension of tasks 001 and 003 above are measured using a written examination. The student must correctly answer at least 70 percent of the questions for each objective. Proficiency of tasks 002 and 004 above, are measured using a performance examination. Operations checks must be performed IAW manufacturers' guidelines and with no safety violations.

REFERENCES: Student handouts and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-003-

TITLE: Video Switcher Operation.

TPFN TYPE AND HOURS: 1.5 L; .5 D; 1.5 PE; 1 EP; .5 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Identify principles of operation.
002 Perform operational checks.

SUMMARY OF INSTRUCTION: Given a video on-air/production switcher; multiple input sources to the switcher; all appropriate test equipment; and manufacturers' technical manuals, and a list of features and functions of other switchers, such as routing and bridging switchers; the student describes the purposes and functions of each type of switcher; and performs an operations check on the production switcher. Comprehension of task 00 is measured with a written examination. The student must correctly answer at least 70 percent of the questions on this objective. Proficiency of task 002 is measured with a performance examination. The student must perform this task IAW the manufacturer's guidelines with one instructor assist, no safety violations, and without error.

REFERENCES: Student handouts and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-004-

TITLE: Distribution Amplifier.

TPFN TYPE AND HOURS: 2.5 L;.66 D; .67 PE; .67 EP; .5 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Identify principles of operation.
002 Perform operational checks and align: (video/pulse/processing).

SUMMARY OF INSTRUCTION: Given a video distribution amplifier (DA), a video pulse distribution amplifier (PDA), and a processing amplifier, along with an input signal and multiple destination devices, schematic diagrams showing how equipment is interconnected, all appropriate test equipment, and manufacturers' technical manuals; the student describes how each type of amplifier functions and performs an operations check and an alignment of each type of amplifier. Comprehension of task 001 is measured with a written examination. The student must correctly answer at least 70 percent of the questions to complete this objective. Proficiency of task 002 is measured with a performance examination. The student must complete the task IAW the manufacturers' guidelines, with one instructor assist, no safety violations, and without error.

REFERENCES: Student handouts and manufacturer's technical manual

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-005-

TITLE: Time Base Correctors / Frame Synchronizers.

TPFN TYPE AND HOURS: 3 L; .5 D; .5 PE; 2 EP; 1 EW

TPFN TOTAL HOURS: 7

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify principles of operations.
002 Identify principles of timing and phasing.
003 Adjust timing/phasing; and; perform sub-carrier/horizontal phasing.

SUMMARY OF INSTRUCTION: Given a broadcast or video production studio, including time base correctors (TBCs) and frame synchronizers (F/S) with input signals and destination equipment, all appropriate test equipment and manufacturers' technical manuals; the student explains how timing and phasing adjustments affect the quality of the video signal, describes the various functions of a TBC and F/S, and performs timing and phasing adjustments to improve the quality of the video signal. Comprehension of tasks 001 and 002 is measured with a written examination. The student must correctly answer at least 70 percent of the questions for each learning objective. Proficiency of task 003 is measured with a performance examination. The student must make appropriate adjustments IAW manufacturer's guidelines, producing a video signal that conforms to NTSC standards with one instructor assist, no safety violations, and without error.

REFERENCES: Student handouts and manufacturers' technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-006-

TITLE: Studio Camera Systems Preparation.

TPFN TYPE AND HOURS: 2 D; 4 PE; 3 EP

TPFN TOTAL HOURS: 9

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Perform light measurement with photometer.
002 Adjust Camera Control Unit (CCU): iris control; master pedestal; black balance; and white balance.
003 Adjust color balance between cameras.

SUMMARY OF INSTRUCTION: Given a TV studio with studio lights, multiple cameras and their CCUs, a photometer, a white chart, all appropriate test equipment, and manufacturers' technical manuals; the student will properly light the studio, and use the CCUs to set the iris control, master pedestal, black balance, and white balance for each camera. Proficiency is measured with performance examinations. The student must perform each task IAW manufacturers' guidelines and NTSC standards, with limited instructor assistance and with no safety violations.

REFERENCES: Student handouts and manufacturer's user and technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 6
Studio Systems

TPFN: AFIS-BTVEM-006-007-

TITLE: Application of Studio Skills.

TPFN TYPE AND HOURS: 1 D; 27 PE; 2 EP

TPFN TOTAL HOURS: 30

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Troubleshoot video system to board / unit level. (enabling)

SUMMARY OF INSTRUCTION: Given a TV studio with various component items necessary to provide a final video signal, all appropriate test equipment, and manufacturers' technical manuals; the student will troubleshoot and identify problems within the designated studio system. The student will be allowed one instructor assist, but must complete the exercise with no errors and no safety violations.

REFERENCES: Student handouts and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 7
Computer Embedded Systems

TPFN: AFIS-BTVEM-007-001-

TITLE: Introduction to Computer Systems (PC):

TPFN TYPE AND HOURS: 12 L; 8 EW; 2.5 D; 7.5 PE; 6 EP

TPFN TOTAL HOURS: 36

PREREQUISITE TPFN: All previous TPFNs

TASK(S):

001 Identify basic computer principles and concepts.
002 Perform operational check.
003 Identify input / output devices.
004 Identify video card functions.
005 Identify audio card functions.
006 Identify drives/storage device functions.
007 Assemble PC.
008 Comprehend operating systems employment.
009 Identify software functions.
010 Identify principles of LAN/WAN.
011 Perform protocol analysis.
012 Troubleshoot computer system to board level.

SUMMARY OF INSTRUCTION: Given a micro-computer (desktop-sized) the student will explain the functions of software, video cards, audio cards, drives/storage devices, operating systems and input/output devices; LANs/WANs. Comprehension is measured by written examination. The student must answer at least 70 percent of the questions for practical knowledge objectives. Students must also be able to perform an operations check, assemble a PC, and troubleshoot to board level and perform protocol analysis without error.

REFERENCES: Student study guide; and student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 7
Computer Embedded Systems

TPFN: AFIS-BTVEM-007-002-

TITLE: Introduction to Computer Systems (Macintosh):

TPFN TYPE AND HOURS: 2.5 L; 2.5 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify basic computer principles and concepts.
002 Identify input / output devices.
003 Comprehend operating systems employment

SUMMARY OF INSTRUCTION: Given a Macintosh desktop computer, student will identify Macintosh computer concepts, input/output devices, and understand the functions of an operating system. Comprehension is measured by written exam and student must answer at least 70 percent of the questions correctly for each exam.

REFERENCES: Student study guide; student handouts; and manufacturer's technical manual.

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 7
Computer Embedded Systems

TPFN: AFIS-BTVEM-007-003-

TITLE: Introduction to Non-Linear Editing.

TPFN TYPE AND HOURS: 1.5 L; 1.5 EW; 4.5 D; 4.5 PE; 3 EP

TPFN TOTAL HOURS: 15

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Identify principles of non-linear editing.
002 Operate a non-linear editing system.

SUMMARY OF INSTRUCTION: Given a non-linear editing system and manufacturers technical manuals, the student will define and perform selected functions of non-linear editing. Competency for task 001 is measured by written exam and student must correctly answer at least 70 percent of the questions correctly. Task 002 must be performed without error IAW manufacturers technical manuals.

REFERENCES: Student study guide; student handouts; and software user's manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, EP, PE)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-001-

TITLE: Radio and Television Transmitters

TPFN TYPE AND HOURS: 4 L; 3 EW

TPFN TOTAL HOURS: 7

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify the principles of

001 Transmission concepts (e.g. block diagrams).
002 Antenna systems (e.g. Dipole, Yagi).
003 Antenna polarization (vertical, horizontal, circular).
004 Radiation patterns.
005 Basic installation considerations.
006 Grounding.

SUMMARY OF INSTRUCTION: Given block diagrams and a list of terms, the student will identify the fundamental concepts, principles and characteristics of transmission systems; define various antenna systems, antenna polarization, radiating patterns; and identify procedures for installing and grounding transmission systems. Comprehension is measured by written examination. The student must correctly answer at least 70 percent of the questions on each objective.

REFERENCES: Student study guide; student handouts

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-002-

TITLE: Cable Head-End Systems

TPFN TYPE AND HOURS: 13.5 L; 1.5 D; 4.5 PE; 4.5 EW; 2 EP

TPFN TOTAL HOURS: 26

PREREQUISITE TPFN: All previous TPFNs

TASK(S): Identify the principles of

001 Cable distribution concepts (e.g. block diagrams).
002 Rack assemblies (routing and forming wiring harnesses).
003 Cable connectors (F type).
004 Video cable (RG type).
005 Use time domain reflectometer.
006 Fiber optics transmission theory.
007 Bandpass filters.
008 Sweep generator/spectrum analyzer.
009 Use wattmeter.
010 Combiner/mixer.
011 Pilot generators.
012 Modulators (radio/TV).

SUMMARY OF INSTRUCTION: Given manufacturer's technical manuals, including block diagrams, the student will explain the signal path through cable distribution systems; describe correct cable routing and wiring harnesses; identify various cables and cable connectors and their specifications; explain the fundamentals of fiber optic transmission; define bandpass filters, combiners/mixers, pilot generators, and radio/TV modulators. Comprehension is measured by written examination. The student must correctly answer at least 70 percent of the questions on each objective. Competency in this unit is essential to student success, and reinforced in the subsequent performance training units for transmission systems.

REFERENCES: Student study guide; student handouts; manufacturers' technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW; 1:4 D,PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-003-

TITLE: Microwave Transmission Systems

TPFN TYPE AND HOURS: 17.5 L; 2.5 EW

TPFN TOTAL HOURS: 20

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify microwave systems concepts (e.g. block diagrams).
002 Identify principles of microwave transmission.
003 Identify studio transmitter link (e.g. infrared, microwave).

SUMMARY OF INSTRUCTION: Given manufacturers' technical manuals, including block diagrams, the student will explain the signal path through selected major circuits of a microwave system, identify characteristics and elements of microwave transmitters, and define various types of studio-transmitter links. Comprehension is measured by written examinations. The student must correctly answer at least 70 percent of the questions on the exam.

REFERENCES: Student study guide; student handouts; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-004-

TITLE: Satellite Transmission Systems

TPFN TYPE AND HOURS: 10.5 L; .5 D; 1 PE; 2.5 EW; .5 EP

TPFN TOTAL HOURS: 15

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Identify satellite systems concepts (block diagrams).
002 Identify principles of satellite transmission.
003 Use field strength meter.
004 Identify principles of data transmission and reception. (digital signal characteristics)
005 Identify principles of compression transmission.
006 Identify principles of receivers/descramblers.

SUMMARY OF INSTRUCTION: Given manufacturers' technical manuals, including block diagrams, the student will explain the characteristics of a satellite transmission system; trace the signal through a satellite system, explaining the purpose of various circuits within the system; describe the signal characteristics during data transmission and reception; and describe how compression techniques are used in transmitting a signal over a satellite system. Comprehension is measured by written examination. The student must correctly answer at least 70 percent of the questions.

REFERENCES: Student study guide; student handouts; and manufacturer's technical manuals

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-005-

TITLE: Transmitter Performance Checks and Alignments.

TPFN TYPE AND HOURS: 4 D; 10 PE; 6 EP

TPFN TOTAL HOURS: 20

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Perform transmitter performance checks.
002 Align exciters.
003 Align antenna-coupling networks.
004 Align RF modulators.
005 Perform field strength measurements.
006 Align power supplies.
007 Align power amplifiers.

SUMMARY OF INSTRUCTION: Given a transmitter, antenna, appropriate test equipment, and manufacturers' technical manuals, the student will conduct performance checks of a transmitter, and align the transmitter and antenna components listed above. Proficiency is measured by performance examinations. The student must perform the checks and alignments IAW manufacturers' guidelines, with no safety violations, and with minimal instructor supervision/assists.

REFERENCES: Student study guide; student handouts; and manufacturers' technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 8
Transmission Systems

TPFN: AFIS-BTVEM-008-006-

TITLE: Transmitter Troubleshooting

TPFN TYPE AND HOURS: 1 D; 5 PE; 2 EP

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001 Troubleshoot transmitter to module level.

SUMMARY OF INSTRUCTION: Given a transmitter, appropriate test equipment, and manufacturers' technical manuals, the student will troubleshoot the transmitter. Proficiency is measured by performance examination. The student must identify the fault down to the module level IAW manufacturers' guidelines, without error or safety violations.

REFERENCES: Student study guide; student handouts; and manufacturers' technical manuals

INSTRUCTOR/STUDENT RATIO: 1:4 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

FUNCTIONAL AREA 9
Field Training Exercise (FTX)

TPFN: AFIS-BTVEM-009-001-

TITLE: Establish Broadcast Communication Links

TPFN HOURS AND TYPE: 2L; 5 D; 12 PE; 5 EP

TPFN TOTAL HOURS: 24

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001 Perform mobile transmitter setup and operational check.
002 Perform microwave dish alignments.
003 Perform satellite acquisition.
004 Perform troubleshooting procedures on microwave systems to unit level
005 Perform troubleshooting procedures on satellite systems to unit level
006 Participate in FTX critique.

SUMMARY OF INSTRUCTION: In a field environment, and given a microwave transmission system and a satellite transmission system, each with its own dish antenna, feedhorn, low-noise amplifier, and receiver decoder; all appropriate test equipment, manufacturers' technical manuals; the student will align the microwave dish, acquire a satellite-based signal, perform field strength measurements, and troubleshoot each system down to the unit level. Proficiency is measured by performance examination. All procedures will be done IAW manufacturers' guidelines, and safety protocols.

REFERENCES: Manufacturers' technical manuals and student study guide

INSTRUCTOR/STUDENT RATIO: 1:8 (L); 1:4 (D, PE, EP)

SAFETY FACTORS: Students must observe all safety precautions concerning the proper use of tools, equipment, and vehicles.

FUNCTIONAL AREA 10
Course Administration

TPFN: AFIS-BTVEM-010-001-

TITLE: Course Administration.

TPFN HOURS AND TYPE: 14 AD

TPFN TOTAL HOURS: 14

PREREQUISITE TPFN: N/A

TASK(S):
001 In-processing/orientation
002 Conduct mid-course critique.
003 Course critique.
004 Out-processing/graduation.

SUMMARY OF INSTRUCTION: Self-explanatory.

REFERENCES: DINFOS Policy and Procedures Manual

INSTRUCTOR/STUDENT RATIO: 1:8 (AD)

SAFETY FACTORS: N/A